

What is claimed is:

1. A compound useful for facilitating a reaction, comprising at least two different heteroatoms selected from the group consisting of N, P, S, O, As, and Sb, and a transition metal, wherein the compound is effective to facilitate a reaction at effective conditions within about 96 hours from being combined with a reactant.

2. The compound of claim 1, further comprising a heterocycle.

3. The compound of claim 1 wherein the different heteroatoms are P and N.

4. The compound of claim 1, further comprising a heterocycle, and wherein one or more N atoms are provided in the heterocycle.

5. The compound of claim 1 wherein the heterocycle is a substituted or unsubstituted pyridine group.

6. The compound of claim 1 wherein the heterocycle is a substituted or unsubstituted imidazole group.

7. The compound of claim 1 further comprising a substituted or unsubstituted phenyl or alkyl group.

8. The compound of claim 1, wherein the transition metal is selected from the group consisting of Group 1B metals, Group IIB metals, Group IIIB

metals, Group IVB metals, Group VB metals, Group VIB metals, Group VIIIB metals and Group VIIIB metals.

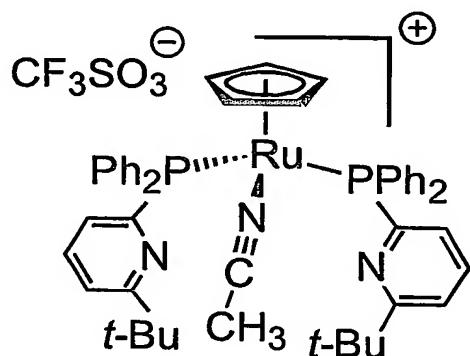
9. The compound of claim 1 wherein the transition metal is selected from the group consisting of Ru and Pt.

10. The compound of claim 1 wherein the compound is effective to facilitate a hydration reaction.

11. The compound of claim 1 wherein the compound is effective to facilitate a hydrolysis reaction.

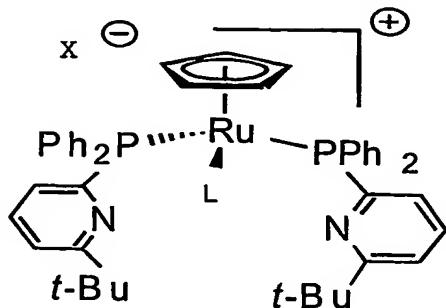
12. The compound of claim 1 wherein the compound is effective to facilitate a reaction at room temperature.

13. The compound of claim 1 having the formula



14. The compound of claim 1 having the formula

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wherein X is an anion and L is a ligand.

15. The compound of claim 1 wherein the compound is effective to facilitate an addition reaction of an amine, an alcohol or water to an alkene.

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16. A composition for facilitating a reaction at room temperature, comprising the compound of claim 1.

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17. The composition of claim 16, further comprising an alkene reactant or an alkyne reactant, and water, wherein the compound is effective in facilitating hydration of the alkene reactant or the alkyne reactant at room temperature.

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18. A method of conducting a reaction, comprising:

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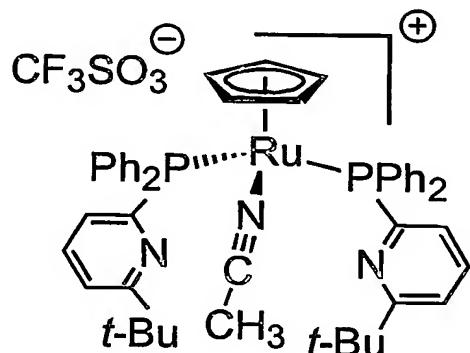
contacting a compound comprising a complex of (i) at least two different heteroatoms selected from the group consisting of N, P, S, O, As, and Sb, and (ii) a transition metal, with a reactant at conditions, including room temperature, effective to facilitate a reaction of the reactant, thereby forming a product of the reaction within about 96 hours from when the compound and the reactant were first contacted.

19. The method of claim 18, wherein the compound further comprises a heterocycle.

5 20. The method of claim 18, wherein the reactant is an alkyne or an alkene, and the compound is effective in facilitating hydration of the alkyne or the alkene at room temperature.

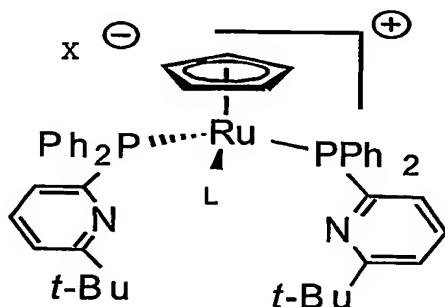
10 21. The method of claim 20, wherein the reactant is an alkyne, and the contacting is effective to hydrate about 98% of the alkyne within about 48 hours.

15 22. The method of claim 18, wherein the compound has the formula



23. The method of claim 18, wherein the compound has the formula

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24. The method of claim 18, wherein the compound is effective in facilitating an addition reaction of an amine, an alcohol or water to an alkene.

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25. The method of claim 18, wherein the compound is effective in facilitating a hydrolysis reaction.

26. The method of claim 18, wherein the compound
10 and the reactant are contacted at a temperature of about 70 degrees Farenheit.

27. The method of claim 18, further comprising a
15 step of determining a quantity of the reactant that has been converted to the product.